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A STRONG INFERENCE INVESTIGATION OF THE JOB CHARACTERISTICS
AND DUAL ATTACHMENT MODELS OF JOB DESIGN

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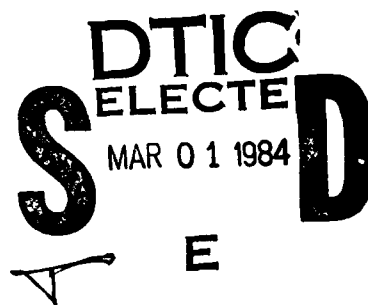
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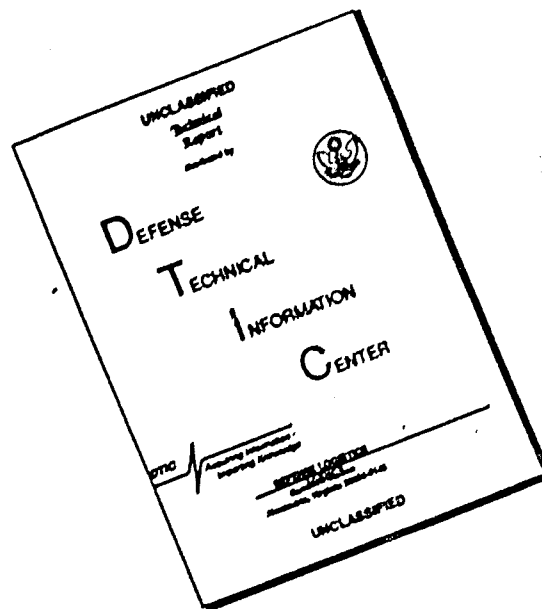
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A field experiment was performed among employees in computer-assisted, paper-processing jobs within a large, public sector service organization. Participants were 106 technical and supervisory dyads. The study employed a pretest-posttest, quasi-experimental design with four different conditions and extended over a 6-month period. The conditions included (a) leader-member exchange training, (b) job design training, (c) a combination of exchange and design, and (d) control or comparison.

The results showed that (1) only leader-member exchange was effective in terms of before-to-after gains in productivity, dyadic leadership, job enrichment, job satisfaction, and coping with job stress, and (2) employee growth needs moderated the relationships between leader-member exchange training and productivity, quality of leader-member exchange, leadership support, and satisfaction with leadership.

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ABSTRACT

The work of service organizations is accomplished through the performance of jobs by organizational participants. These jobs are sets of behaviors that are performed by members in particular positions. Organizations are designed for efficient operations by dividing complex tasks into specialized activities, assigning these activities to particular jobs and integrating the outputs of these activities into a final product or service. An organization may operate at an extremely efficient level due to superior technology, advantageous positions in its various input and output markets, and a very appropriate type of job system for its participants. Consequently, it is of practical as well as theoretical significance to understand the job design systems within organizations.

Traditional notions of job design have been challenged recently by the job enrichment movement. Job enrichment, according to its proponents, is more compatible with the contemporary values of organizational participants than traditional bureaucratic and administrative models of job design. Although bureaucratic and administrative models worked reasonably well during the first half of the twentieth century, these models were overly economic and inadequately psychological for the second half of this century. Rather, job enrichment models which incorporate a more appropriate balance between economic and psychological factors are preferred.

A basic assumption of the job enrichment movement is that today's employees seek and even expect psychological outcomes from their jobs. Moreover, they cannot be motivated adequately unless these intrinsic outcomes are built into their jobs. Hence, jobs must be designed to reflect this change in contemporary social values regarding work.

Though few experts would argue with the validity of the above assertion, many would dispute the validity of any particular panacea at the present time. Not enough is understood about effectively designing psychological outcomes into jobs. It is known, however, that simply giving employees the duties and responsibilities of their immediate supervisors without a promotion does not work for very long. It also is known that the effects of designing psychological outcomes into jobs depend upon particular needs and preferences of the employees. Only when the outcomes match the needs will the expected effects be forthcoming. Otherwise, the employee reactions may be at best unexpected and at worst dysfunctional.

Two of the more promising models of job design specify this necessary match between psychological outcomes and employee needs. These two models are the Job Characteristic model (Hackman and Oldham, 1976) and Dual Attachment model (Graen and Ginsburgh, 1977). These two models were tested in this proposed study against each other within a strong inference investigation. Experimental procedures were employed to test the statistical, internal, external, and construct validity of competing hypotheses derived from these two models and an attempt was made to merge the valid portions of the two models into a single hybrid.

A field experiment was performed among employees in computer assisted, paper-processing jobs within a large, public sector,

service organization. The participants were 106 technical and supervisory dyads. This study employed a pretest-posttest, quasi-experimental design with four different conditions and extended over a six-month period. The conditions included (a) leader-member exchange training (Dual Attachment model), (b) job design training (Job Characteristics model), (c) a combination of exchange and design and (d) control or comparison.

Results showed that only the leader-member exchange (LMX) condition was effective in terms of before to after gains in productivity, dyadic leadership, job enrichment, job satisfaction, and coping with job stress. In addition, employee growth needs moderated the relationships between LMX training and the dependent variables of productivity, quality of leader-member exchange, leadership support and satisfaction with leadership. In this case, the advantage was to the high growth need group who received LMX training.

This investigation concludes that an LMX intervention can produce improvements in both the dyadic exchange linkage and the work itself linkage and that employee growth needs can moderate the effects of this intervention. The implications of these results are discussed and suggestions for future research are offered. Clearly, much remains to be discovered about effective job design, especially the processes whereby jobs are enriched with predicted consequences within public sector organizations with civil service rules and regulations.

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Statement of Research Objectives

Job design has been used increasingly in conjunction with organizational change programs aimed at improving organizational functioning. Within these programs, jobs are designed to allow organization members to better satisfy important psychological needs while functioning effectively in the performance of their jobs.

Despite early methodological difficulties (Wernimont, 1966; King, 1970), the "Work Itself" approach (Herzberg, Mausner, Peterson, and Capwell, 1957; Herzberg, Mausner and Snyderman, 1959) to job design has met with some apparent success (Ford, 1969; Paul, Robertson, and Herzberg, 1969; Hackman, Oldham, Janson and Purdy, 1975). However, it has become clear that the effects of job enrichment treatments are complicated by interactions with worker needs (Turner and Lawrence, 1965; Hulin and Blood, 1968; Graen, Dawis and Weiss, 1968; Hackman and Lawler, 1971; Graen, Orris, and Johnson, 1973; Beer, 1975; Hackman and Oldham, 1975; Oldham, 1976; Graen and Ginsburgh, 1977).

Of several job design models proposed, two of the more potentially fruitful in exploring the relationships of job characteristics and worker needs to employee responses are the Job Characteristics model (Hackman and Oldham, 1976), and the Dual Attachment model (Graen and Ginsburgh, 1977). These two models seek to describe the processes whereby inputs (job characteristics and worker needs) are transformed into outputs (employee responses). In contrast to the traditional input-output models employed in this area, both the Job Characteristics and the Dual Attachment models include throughput constructs.

According to traditional models, worker reactions, such as withdrawal behavior, can be explained indirectly by attitudes concerning the job and its context. Consequently, negative job attitudes or job dissatisfaction at one point in time is used to account for subsequent job terminations (Hulin, 1966; Katzell, 1968; Waters and Roach, 1971). Clearly, these input (job attitude) - output (termination) correlations presume a random or at least a non-interactive (or non-mediating) process between input and output. To the extent that interactions of input with process variables effect outputs, these assumptions regarding the null effects of throughput become detrimental. Where the relationship between input and output depends upon the nature of the throughput, one cannot predict nor understand output without assessing both input and throughput and the relationship between input and throughput combined and output.

Job Characteristics Model

As a party to a mutually beneficial relationship, organizations provide the means to satisfy some of their members' needs in exchange for job performance. Most organizations have sought to fulfill these obligations by responding to the economic or material needs of their members. However, the psychological or non-material needs have been overlooked. Hackman and his colleagues (Hackman and Lawler, 1971; Hackman and Oldham, 1975, 1976; Hackman, 1977) have identified two classes of such needs: (a) Needs for personal growth and development, and (b) needs for meaningful social relationships. Hackman and Lawler (1971) found that the level of personal growth needs mediated employee reactions to complex jobs; individuals with high growth needs responded more positively to jobs offering opportunities for growth and development

than individuals with low growth needs.

According to this Job Characteristics model, as shown in Table 1, the match between need strength and job characteristics is hypothesized to mediate the job characteristic-outcome relationship. For example, a monotonically increasing function between job scope (input) and employee job satisfaction (output) is hypothesized for individuals exhibiting high but not low growth need strength. To the extent that a job is deficient in any of the five critical elements (skill variety, task identity, task significance, autonomy, and intrinsic feedback), decreased work (performance and turnover) and personal (satisfaction) outcomes are hypothesized as a consequence. Therefore, changing the composition of the job to improve the deficient critical elements is predicted to lead to enhanced personal and work outcomes. The adequacy of each critical job characteristic depends upon the particular need state of an employee. Therefore, the appropriate scope of a job is determined by the task-related need state of the worker.

In contrast to the disappointing results of research on the nature of other variables moderating the job characteristic-worker response relationship (Hulin and Blood, 1968; Hulin, 1971, Shepard, 1970; Stone, 1976; Wanous, 1974), research aimed specifically at assessing the Job Characteristics model has been generally consistent.

Operationally, the motivating potential score (MPS), Hackman's measure of job potential, has shown stronger relationships with work and personal outcomes for individuals with higher growth needs than for individuals with lower growth needs (Hackman and Oldham, 1976; Oldham, Hackman and Pearce, 1976; Oldham, 1976). Technically, support for this proposed mediating effect of growth need strength (GNS), however, requires that correlations for higher and lower growth need groups be significantly different from each other. Although the signs and magnitudes of the obtained correlations have been in the predicted directions and different from zero in much of the above research, differences between correlations of high and low GNS groups have not been consistently significant. Moreover, the possibility remains that the correlational studies presented in support of the model may have identified differences which were functions of other variables. Clearly, what is needed is an experimental manipulation of the critical job elements in a field test of the model.

Umstot Experiment

Umstot, Bell, and Mitchell (1976) reported on a study designed to test the Job Characteristics Model against a Goal-Setting Model of work design on satisfaction and performance. This investigation was the first attempt to manipulate task characteristics in accordance with the assumptions of the Job Characteristics model in a simulated organization (see Graen 1969) for a discussion of the advantages of a simulated organization in organizational research), where the investigator's control of the work environment is dominant.

In Phase one of the two Phase design, dichotomization of employees into high and low growth need strength (GNS) yielded no significant difference in correlations between the two groups. While no data for GNS relationships were reported for Phase two (Umstot *et al.*, 1976), it was learned that no evidence of a mediating effect for GNS in this

Table 1

Components of the Job Characteristics Model

Required Behavior	Theoretical Constructs	Theoretical Mediator	Immediate Outcome	Organizational Outcome
	<u>Job Characteristics</u>	<u>Match</u> between		
1	Skill Variety	job character-		
2	Task Identity	istics & Task-	Accept	Satisfacti
3	Task Significance	related needs	or Reject	with Work,
.	Autonomy	(Growth Need	Job	Withdrawal
I	Feedback (Intrinsic)	Strength)		Performanc

phase or between phases was found (personal communication).

Quasi-Experiment In A Field Setting

Hackman, Pearce, and Caminis (1976) reported on the results of a naturally occurring quasi-experimental investigation of the Job Characteristics Model. Here the tasks of clerical bank personnel underwent changes when a computerized data tape storage system replaced the previous card storage system. Adjustment of clerical tasks was initiated only to accommodate the new tape system, and did not include any implicit or explicit management decision to improve the jobs of the effected personnel. Change processes were initiated solely on the tasks themselves, setting up the opportunity to assess the effects of an "uncomplicated" work redesign program on employee attitudes and behavior. As Hackman noted . . .

" . . . Work redesign activities invariably involve numerous changes extending well beyond alterations in job characteristics themselves, e.g. revision of compensation practices, placement and promotion policies, supervisor-subordinate relationships, and so on.

While such non-job changes may help insure the success of a change project (and, indeed, may be instituted specifically to buttress and reinforce improvements made in the job itself), they also increase ambiguity about what actually caused any changes in work attitudes or behavior that are found." (p.8)

While a pre-change assessment of the motivating potential of the jobs revealed an average MPS greater than one standard deviation below the national average (as reported by Hackman and Oldham, 1975), the postchange MPS revealed a decrement in average motivating potential exceeding two standard deviations below the national average. Understandably, the net effect of the task changes on the motivation and satisfaction of the clerical personnel was unfavorable. Overall, there was a decline in the expressed attitudes of the employees, and no change in their absenteeism, supervisor-rated performance, and GNS.

Support was found for a moderating effect of GNS on behavioral responses to changes in task characteristics but for performance ratings only. Rated performance of individuals with low growth needs increased when the motivating potential of jobs decreased, and decreased when the motivating potential of jobs increased; a positive relationship between change in MPS and rated performance was found for individuals with high growth needs. A surprising result was a positive relationship between change in MPS and absenteeism for high GNS individuals; whereas, no systematic change in these two variables was found for low GNS individuals.

The Umstot et. al., (1976) and Hackman et. al., (1976) examples underscore both the success and failure of the usual approach to job enrichment. In both cases changes in job characteristics took place without regard to employees' preferences and needs. The differential treatment of identifiable subgroups of employees with respect to work design alone does not ensure the appropriate or expected positive attitudinal and behavioral responses; employees' need are still being

prescribed. To the extent that they hold the prescribed needs and find the offered rewards attractive, then a work redesign program tailored to the group probably will be successful. However, to the extent that they do not share the prescribed needs and preferences, lasting improvements may not be realized.

These problems and the moderate amount of behavior explained have promoted a re-assessment of the contribution of relational variables to job outcomes. Recent investigations have found evidence supporting the role of relational variables in mediating the direction and magnitude of employee responses to task attributes (Oldham, 1976; Oldham, Hackman and Pearce, 1976; Graen and Ginsburgh, 1977).

The causal claims made regarding the mediating effects of the job-need match on employee responses to enriched work have yet to be evaluated experimentally. Clearly, the correlational studies supportive of the model may be identifying the effects of variables other than those specified and the quasi-experiment of Hackman and his colleagues did little to reject this alternative. While it is generally agreed that job enrichment is related to satisfaction, its relationship to performance outcomes and withdrawal behavior is much less clear. The procedures and conditions recommended for the successful implementation of enrichment to a given work situation have yet to be specified. What is clear from the research reviewed is that the Job Characteristics model alone is insufficient to account for the variability of responses to enriched work.

Dual Attachment Model

The exchange-oriented, Dual Attachment model (Graen and Ginsburgh, 1977) can be seen as an integration and extension of the framework provided by the Job Characteristics model and the VDL model of leadership (Graen and Cashman, 1975; Graen *et. al.*, 1972). The underlying provisions of this model are: (a) that the concept of the job is not only defined by specific task domains, but encompasses several relational domains, including the leadership domain, and (b) that the decision of an employee to actively participate and remain in a job is a function of at least the interaction of the elements from the above domains. An individual's response to the job is affected by person variables, job variables and their interactions.

Role-Making

The dynamics of the processes which produce dyadic (two-person) social structures (Weick, 1969) between persons stratified in a hierarchical organizational setting have been termed "role-making" (Graen, 1976). Within the role-making processes of the vertical dyad, a leader and member work through how each will behave in certain situations and agree upon the general nature of their relationship by establishing relationship norms. Research on role-making in leader-member dyads has indicated a consistent pattern of team building characterized by distinct leader-member exchanges. Thus, when faced with the task of developing new working relationships with their unit members, leaders tend to respond in ways which differentiate the unit (Dansereau, Graen, and Haga, 1975; Graen, 1976; Graen, Dansereau, Haga,

and Cashman, 1975; Cashman, Dansereau, Graen, and Haga, 1976; Liden and Graen, 1980; Graen, Hoel and Liden, 1980). The intraunit differentiation tends to develop into a range of distinct exchange patterns: a leadership exchange relationship (transcending the formal employment contract obligation) at one pole, and a supervision exchange relationship (based primarily on the formal contract) at the opposite pole.

Not all members develop special exchanges with their leader. Some are not given the opportunity and others may decline the offer. Those who do accept, however, develop high quality dyad exchanges and receive additional resources and rewards not available to members with lower quality exchanges whose leader-member relationships are characterized by the formal employment contract (supervision exchange). Leader's influence in a leadership exchange then rests primarily within the high quality interpersonal exchanges developed with members and not in the formal authority of his or her position. In exchange for positional resources (i.e., privileged information, challenging projects, greater influence in decisions, etc.), the member commits himself or herself to higher degrees of involvement in the unit's functioning, including greater time and energy expenditures than required by the formal contract, acceptance of greater responsibility and a vested interest in the success of unit functioning.

Implicit in the team development process are the higher levels of trust and support required of both the leader and the member. As the terms of the in-group leadership exchange are extra-contractual, both members to the exchange assume greater risks. The leader surrenders some potential control over the member but remains responsible for the successful completion of delegated tasks. On the other hand, the member assumes additional responsibility without a corresponding increase in position and pay, and must trust that the leader will honor (and continue to honor) his or her end of the agreement.

The potential benefits to both parties to the exchange, however, are ample; freedom from some administrative functioning allows the leader to assume additional responsibility or expand his or her behavioral repertoire; outcomes for the member may include better performance ratings, greater overall satisfaction with the work situation, and less severe job problems (such as, bureaucratic delays and red tape). The attractiveness of a high quality exchange is enhanced further by the demonstrated tendency for the exchange relationship behavior to remain stable over time. Change in the functioning of the dyadic exchange may be generated internally (e.g., either one or both of the parties "signal" the desire to re-negotiate the terms of the relationship) or externally (e.g., a change in the work flow process which directly affects both parties). In the absence of pressure for change, the behaviors may remain interlocked indefinitely.

Dual Linkages

The dual attachment of the organizational member to his or her

organizational role illustrated in Figure 1 is based on earlier investigations of Graen and his colleagues (Graen, Orris, Johnson, 1973; Graen and Ginsburgh, 1977) of withdrawal behavior in organizations.

Two dimensions identified as relevant in predicting employee responses are the task and leadership domains. The task domain, represented by the person-task link includes task characteristics similar to those specified in the Job Characteristics model, appropriate to this sphere, for example, are the amount of task challenge offered, the degree of latitude in task performance, the amount of information available through performance of the task, and the like. The leadership domain encompasses the exchange relationship existing between the member and his or her immediate superior. Important outcomes in this domain include the degree of reciprocal trust and loyalty in the relationship, the amount of leader attention and support received, and the amount of positive and negative feedback received from the leader. Evidence supports the existence of a compensatory relationship where adequacy of one domain can offset a deficiency in the other domain (Graen and Ginsburgh, 1977).

As shown in Table 2, two variables are hypothesized as mediators of the relationship of the dual attachments to work and personal outcomes. The first refers to the nature of the match between job characteristics and an individual's career growth needs (i.e., the perceived relevance of the task for realizing future career goals). Career growth needs can be understood as a class or set of needs for self-growth and development relevant to an occupational category. Expression of these needs is found through the capacity of one's present position to assist in self-development as a professional or expert in a chosen occupation. The relevance of the presently occupied organizational position to career goals is a determining factor in the motivating potential of career growth needs. An individual may respond more positively to a relatively unchallenging job which is nonetheless related to one's career interests, than to a challenging job which has no relevance to career plans. Individuals with low correspondence between career needs and jobs tend to manifest lower satisfaction and performance outcomes and higher resignation rates than individuals with a high correspondence of career needs and present job (Graen *et. al.*, 1973).

The second variable, specifying the "fit" or correspondence between the job and leadership growth needs, completes the leadership link to the job. It represents the extent to which the leader's acceptance and support for the member, and profference of relevant performance feedback matches the needs of the individual in this domain. Leadership needs refer to an individual's needs and desires to develop beyond his or her organizationally defined work role or position and reflect a desire to accept (or reject) more responsibility for areas outside of one's own task domain. The requisite training in leadership skills preceding this kind of unofficial promotion is passed on informally from the leader to the member through the mechanisms accompanying a mentor-protege relationship.

Two relationship dimensions appear to exist within the leadership domain: one concerning task-related exchanges, and the other involving interpersonal exchanges; both are extra-contractual exchanges

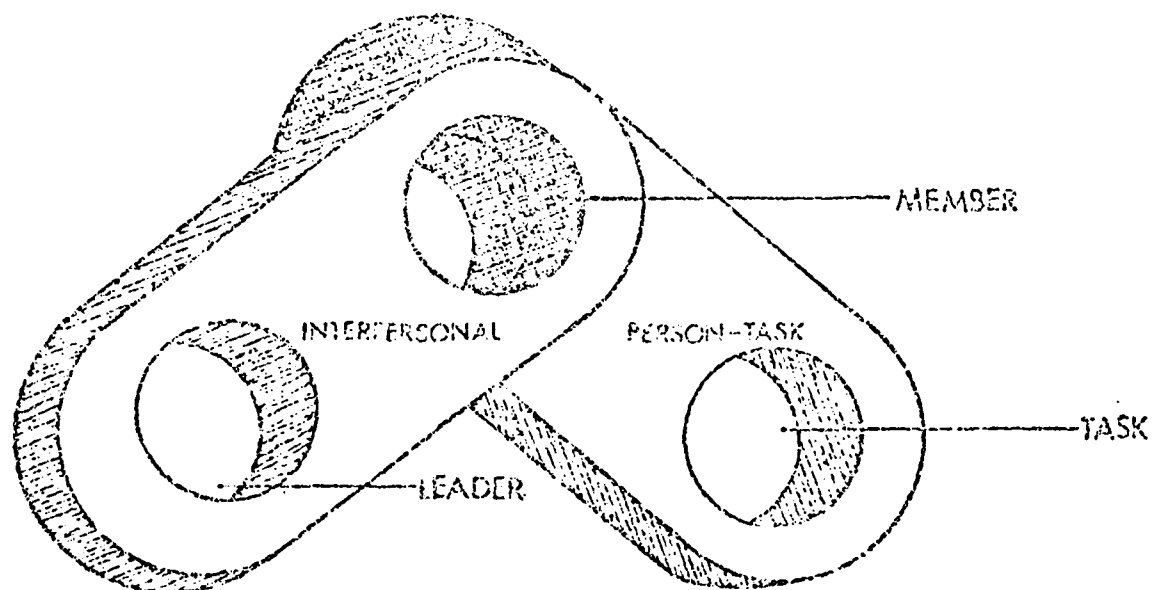


Figure 1

Table 2

Components of the Dual Attachment Model

Required Behavior	Theoretical Constructs	Theoretical Mediator	Immediate Outcome	Organizational Outcome
<u>Task Domain</u>				
	<u>Job Characteristics</u>	<u>Match between</u>		
1	Skill Variety	job character-		
2	Task Identity	istics & Career	Accept	Satisfaction
3	Task Significance	growth needs	or Reject	with Work,
.	Autonomy	(Role	Job	Withdrawal,
1	Feedback (Intrinsic)	Orientation)		Performance
<u>Leadership Domain</u>				
	<u>Exchange Characteristics</u>			
1	Information	Match between	Accept	Satisfaction
2	Influence	Exchange char-	or Reject	with Leader
3	Respect	acteristics &	Relation-	ship, With-
.	Trust	leadership	ship	drawal, Per-
.	Support	growth needs		mance
0	Feedback (Extrinsic)			

and may function singly or in a combined manner. Task-related exchange needs include the need for additional job and organizational information, latitude within and across one's officially designated work position, detailed feedback on one's job performance, and incremental influence in decisions regarding one's work unit. Interpersonal exchange needs include support for one's actions, leader's trust in one's abilities and integrity, consideration for one's personal needs and problems, and mutual respect between the leader and member. An interactive relationship has been found between the career growth need match and the leadership growth need match. This interaction showed that the negative effect of low match on one dimension can be overcome by a high match on the other dimension.

Methodological Issues

1. Procedural differences and methodological problems prohibit making broad generalization concerning much of the Job Characteristic research presented here. With two exceptions (Hackman *et. al.*, 1976; Umstot *et. al.*, 1976), all investigations of the Job Characteristics Model have been correlational, precluding the testing of a causal role for psychological states or any other variable in effecting the relationship between dimensions of the task and employee response.
2. Differential individual response to task dimensions need not be dealt with at the level of abstraction of psychological processes. While individual attributes (such as GNS) may influence some aspect of individual response to the job situation, their existence has been inferred from stated outcome preferences.
3. Difficulties with growth need strength have been both theoretical and operational. A major operational problem has been the low variability and low ceiling effects (Oldham, Hackman, and Pearce, 1976; Hackman and Oldham, 1975; no descriptive data on GNS were reported for the Umstot *et. al.*, sample). This pattern may suggest that higher than average GNS scores were obtained by chance alone making a high/low dichotomization, for purposes of analysis, arbitrary. An alternative explanation, however, suggests that the GNS measure is triggering a social desirability response set. This explanation could account for the lack of significant differences between high and low GNS groups. To the extent that the measure is tapping extraneous response influence, GNS may be a highly reliable but inappropriate measure for its intended purpose. Moreover, the usefulness of the GNS may be further obscured by its interpretation. Specifically, the concept of growth needs and their satisfaction in the Job Characteristics Model may be too narrowly defined within an individual's work domain to include the possibility of their expression in non-work domains. It may not be only internal work motivation which is being assessed, but rather a generalized internal motivation of which work may or may not be the dominant aspect.
4. While the Umstot *et. al.*, (1976) investigation has come the closest to experimentally verifying the Job Characteristics Model, it falls short of an adequate test of the model. The abrupt nature of the manipulations and parttime status of the worker/subjects weakens the study's generalizability to field settings; the exclusion of a GNS measure on post-enrichment positions leaves the verification

of moderating effects unanswered.

Clearly, research is needed to sort out the claims of job enrichment approaches. By field testing two competing models within the same design, the sorting process can be enhanced (Platt, 1964).

Method

This investigation was designed to (a) experimentally test the Job Characteristics Model, i.e., to assess the strength of intrinsic mediating variables (growth need strengths) in predicting individual response to enriched work, (b) experimentally test the Dual Attachment Model, i.e., to assess the strength of growth need strength in predicting individual responses to enhanced leadership exchange, and (c) test the two models together, i.e., to assess the combined predictive strength of the Job Characteristics model and the Dual Attachment model.

Site and Participants

The study was performed within a large government installation in the Midwest. As a Federal institution, the organization operated under a highly bureaucratized Civil Service System which renders job redesign an especially complicated undertaking. The difficulties inherent under such a system have virtually excluded government organizations from job enrichment research. In fact, only one other enrichment experiment has dealt with such an organization (Locke, Sirota, and Wolfson, 1976).

Within this location over 4,000 employees process paper forms using modern computer assisted technology. One entire department from this location participated in this study. Although participation was voluntary and employees were required by regulation to sign a waiver to participate, 98% signed the waiver and participated. Moreover, in this department all participants in the study had the same job titles and the same job description, employed the same equipment using the same procedures, and were assigned work randomly from a common batch of cases.

It must be noted, however, that these jobs were neither simple nor routine. Rather, they were complex, involving on a daily basis numerous and varied individual decisions to be made in accord with weekly updated federal policies and regulations. These decisions directly affected their quantity and quality of production. The frequency and volume of procedure changes notwithstanding, the week one (1) reading on the Motivating Potential Scale (MPS) placed this job in the range of office and clerical and below that of technical positions.

Characteristics of the sample are shown in Table 3. As can be seen in this Table, nearly all were at the top of their grade (GS-7). Most were high school graduates over forty years of age, permanent employees and worked full time processing cases using computer terminals (CRT). Almost all participants were female.

Procedure

The design of the study was a Before-After quasi-field experiment.

Table 3
Description of Sample

Measure	Double Training	Job Design Training	Leadership Training	Comparison Group
Salary Grade:				
GS 3	0	1	1	0
GS 4	2	2	1	1
GS 5	2	4	1	1
GS 6	4	1	1	2
GS 7	24	19	27	12
Total	32	27	31	16
Age:				
Under 30	2	2	0	2
30 to 39	15	4	9	7
40 to 49	9	12	11	4
Over 49	6	9	11	3
Education:				
Less than High School	2	0	3	1
High School Graduate	16	15	15	5
Technical School	5	5	4	3
Some College	9	5	9	6
College Degree	0	2	0	1
Permanent	23	22	23	12
Temporary	9	5	6	4

Questionnaires were administered to participants in small groups and to their immediate supervisors at week one (before) and at week 26 (after). Participants were assigned to one of four treatment conditions by work units. Of the total 132 participants at time one, (a) two units of size 20 each were assigned to the LMX only condition (N=40), two units of size 19 and 20 were assigned to the Job Design condition (N=39), two units of sizes 20 and 17 were assigned to the combined condition (N=37) and one unit of size 6 was assigned to the control or comparison condition. During the six months of the experiment, seventeen (17) participants left the subject department. Those who left were distributed as follows: LMX lost 7, Combined lost 4, Design lost 6 and Control lost none. Unusable questionnaires accounted for the remaining differences between initial and complete information. The experimental loss is shown in Table 4.

Treatments

Job Design. Based upon interviews with the participants and their unit managers prior to week one (1), several aspects of the focal job appeared to be likely candidates for enrichment. Improvements in these critical elements as prescribed by the job characteristics model were attempted to enhance the motivating potential and reduce the irritation level of the job.

The managers of the units receiving this treatment and these managers' two immediate superiors received six (6) two-hour sessions (over six weeks) of job design training. This training comprised: (1) prescriptive material on the job characteristics model and on the process of job design, (2) instruction on and practice in basic problem solving procedures for job design, (3) applications of the above to the focal job, resulting in three implemented job changes described below, (4) consultation with a representative group of participants about the proposed changes, and (5) finalization of the job changes by unit managers and by upper management who had the final say over the changes.

The three implemented job changes were as follows. First, a more discriminating performance feedback system which separated errors into critical and non-critical categories replaced a feedback system with only a single category of error. In this new system, critical errors were those that made a real difference to the client; whereas, non-critical errors were those that made no real difference to the client. This change was designed to improve the feedback or knowledge of results aspect of the job. Second, job autonomy was addressed by allowing participants greater work pace control. Whereas the standard procedure of work control was to have one's manager select and distribute cases to be processed, under the changed procedure, each participant selected the number and type of cases that she would process. Although all participants were held accountable to the same overall standards, this change was designed to improve the autonomy or self-determination aspect of the job. Third, information overload was dealt with by instituting an information condensor function. Under this new procedure, managers accepted the responsibility to master, organize and condense all notices of changes in policies, regulations and procedures to be used by participants and

Table 4

Design of Experiment

	Initial	Complete Information
Leader-Member Exchange Only	N=40	N=31
Job Design Only	N=39	N=27
Job Design and L-M Exchange	N=37	N=32
Control	N=16	N=16
	N=132	N=106

to present this processed information to participants in a short weekly meeting where all questions could be answered uniformly. Though this third change was not derived directly from the job characteristics model, it dealt with a major source of irritants and a likely detractor from the motivating potential of the job. The implementation of these three changes comprised the job design treatment.

An outline of the job design training is the following.

1. Job design: People at work
 - Socio-technical systems
 - what is done by coordinating human effort
 - Technical aspects: workflows
 - Social aspects: interactions in doing the job
2. Job Characteristics Model
 - task variety
 - task identity
 - task significance
 - feedback
 - autonomy
3. Problem-Solving Process
 - identification of issues
 - analysis of issue
 - developing possible alternative solutions
 - deciding on a solution
 - implementation
 - evaluation
4. Job Analysis and Redesign
 - workflow analysis
 - placing the job in its context
 - identification of problematic aspects or issues
 - apply Job Characteristics to solutions
 - outlining one of several possible changes/solutions
5. Job Analysis and Redesign (continued)
 - outline 3 desired changes
 - fill out in detail steps for implementation
 - take ideas to subordinates and superiors for their comments and report back next session
6. Finalize Job Redesign
 - attend to feedback received
 - finalize steps and dates for implementation of each job revision

Nine weeks after the implementation of these changes were initiated a manipulation check was made. Participants reported that all three changes were in operation (approximately three weeks after the implementation phase began).

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Leader-Member Exchange. The framework for the leadership treatment was derived from the concept of leadership as an increment in influence over and above that specified by the formal supervisory role (Katz and Kahn, 1966). While the legitimate authority attached to an organizational position is reflected in the supervisor's role, the leadership that develops and resides in the leader-member exchange between superiors and their subordinates is based upon the use of discretionary influence by the superior (Jacobs, 1970).

Based on interviews with participants and the unit managers prior to week one, so much of the manager-member interactions had been formally specified and regulated that identifying allowable influence opportunities over and above those formally designated was neither easy for the researchers nor at all obvious to the participants. This was not unexpected given that the site was a large Federal agency and the organizational level was relatively low.

The managers of the units receiving this treatment and their two immediate superiors received six (6) two-hour sessions (over a six week period) of Leader-Member Exchange training. The training comprised: (1) information about findings in managerial effectiveness, role overload, dyadic work relationships and network management, (2) instruction in analysis of the dyadic work relationships between the unit manager and each unit member, (3) instruction on and practice in a delegation process, (4) guided analysis of their own work load and work issues, and (5) integration of the above in preparing for one-to-one conversations with each unit member.

The actual treatment was a series of one-to-one conversations between unit manager and member which was to last 20-30 minutes (most, in fact, were reported to last 30-45 minutes). The general structure of the conversations as devised by the managers during the training sessions was: (1) to spend time talking about each person's gripes, and concerns and expectations as they see them rather than management's issues and concerns, (2) to be attentive and sensitive to the issues raised (using "active listening" skills taught in the training) and thereby show understanding, making no promises and (3) to be open about one's own work issues and concerns from the unit manager's point of view. Increasing the level of reciprocal understanding within dyads about job issues was the limited goal of the treatment.

An outline of the Leader-member exchange training is as follows.

1. Managerial Effectiveness

- normal managerial functions
- normal managerial overload
- network of managerial relationships
- use of formal and informal influence
- leader-members exchange as key principle
 - for managing relationships
 - for managing overload

2. Network Management

- identification of one's network
- analysis of dyadic relationships within network
 - special focus on manager-subordinate dyads

3. Delegation
 - signs that there is a need
 - benefits
 - preliminary stages
 - process of delegation
 - key elements to be included
 - points to keep in mind - "check" yourself
4. Network Development
 - revise above analysis
 - analyze your own workload again
 - develop exchange proposal (1st draft)
 - try out 2 "exchanges" before next session
5. Exchange Analysis
 - discuss "exchanges"
 - what worked, what didn't work and why
 - devise 2 new "exchanges" to be tried out again
 - role play "exchanges"
 - try out "exchanges" again
6. Final Exchange Structure
 - discuss "exchanges"
 - devise final structure of exchange
 - how much can be done in the time available?
 - what are the specific realistic objectives that can be accomplished?
 - what should a successful exchange contain?

Nine weeks after the implementation of this treatment was begun, a manipulation check was conducted. Every participant in this treatment condition (except two who had been absent during the entire period) reported having participated in a special one-to-one conversation with their unit manager and that the general topics were understanding and sharing about work issues. A full 90% of the conversations were reported to have occurred during the first 3 weeks of implementation.

Job design intervention was assigned to two conditions: both the job design only and the combined job design and leader-member exchange condition. Similarly, leader-member exchange training was assigned to both the leader-member exchange only and the combined conditions. In addition to the above training, all managers in the department including the control condition received three two-hour sessions (six hours) of instruction on the role of a manager.

The calendar of events was as follows. The entire study covered the six months containing the annual peak load for the department: June through early December. Interviewing and analysis of departmental functioning was completed and questionnaires were readied by the first week in June. During the first week in June, questionnaires were administered to all participants in small groups (week one). All managers received their standard six hours of instruction from the second week of June to the first week of July. From the second week in July through the third week in August, managers received the job design training or the leader-member exchange training or both

(combined) or neither (control). From the last week in August through the second week in September, the leader-member exchange conditions were implementing the one-to-one sessions and the job design conditions were implementing the job changes. Hence by the end of week 14 (the second week in September), the before period was concluded. The criterion period extended from week 15 through week 26 (the second week in December).

Instruments

Moderating Variable. Hackman and Oldham's (1975) measure of employee needs for growth on the job, Growth Need Strength (GNS), was employed in an attempt to identify members who would react more and less positively to the interventions. This measure is comprised of 12 forced-choice preference items which contrast growth and nongrowth job outcomes. Although the ipsative nature of this device renders internal consistency estimates of reliability inappropriate, the test-retest correlation estimate was .65 for the six-month (26 weeks) interval between the before measure (week 1) and the after measure (week 26). The GNS mean was 38.6 at week 1 and 38.2 at week 26 and the GNS standard deviations were 5.7 (week 1) and 4.9 (week 26). For further information on this measure, see Hackman and Oldham (1975).

Dependent variables employed in this study number twenty-eight and were categorized into (a) hard productivity (two measures), (b) supervisory ratings (four measures), (c) member leadership scales (three measures), (d) a leader and member agreement index (one measure), (e) employee rating scales on the value of the job (two), attitudes toward the job (seven), job problem severity (three) and job stress (six). Reliability estimates on these measures are shown in Table 5.

Productivity. Productivity was measured by collecting weekly output tapes of individual performance from computer files and converting these data into individual quantity and quality indices in the following manner. Quantity of production was the total number of cases completed by an individual in a specified week divided by the total number of hours worked on these cases that week. Quality of production was the total number of errors detected by a quality review process in a specified week divided by the total number of cases completed during that week. Quantity and quality were calculated for each of the 26 weeks. It should be noted that this weekly productivity information on individuals was not available to supervisors either before or during the study.

Supervisory Ratings. Supervisors made separate ratings on each of their unit members using four different measures. In an attempt to encourage leaders to make distinctions among their members, for each question asked of a leader about members, the leader was to place all members along a single continuum. The position of each member was indicated by that member's initials on the scale. Using this procedure, each leader rated the overall job performance, the quality of the leader-member exchange, the amount of self-determination permitted and the dyadic loyalty of all of her or his members. Overall job performance was assessed employing the Employee Rating

Table 5

Internal Consistency Reliability Coefficients
(Cronback Alpha) and Stability
Estimates (Test-retest correlation) on Dependent Variables

Measure	Number of Items	Alpha		Before Correlation	After Correlation
		Before	After		
Productivity:					
Quantity ...	26	a	.91	.59	
Quality ...	26	a	.70	.39	
Supervisory Ratings:					
Employee Performance ...	6	.92	.92	.85	
Leader-Member Exchange (LMX) ...	7	.65	.79	.39	
Self-determination (S-D) ...	3	.80	.67	.64	
Dyadic Loyalty (DL) ...	3	.88	.85	.28	
Leadership Measures:					
Leader-Member Exchange (LMX) ...	7	.86	.84	.67	
Self-Determination (S-D) ...	3	.56	.61	.57	
Dyadic Loyalty (DL) ...	3	.59	.72	.46	
Dyadic LMX Agreement:					
Leader-Member Exchange (LMX) ...	7	.68	.62	.48	
Employee Reactions:					
(a) Value of the Job:					
Motivating Potential Score (MPS) ...	5	.75	.63	.57	
Role Orientation (RO) ...	1	b	b	.52	

Table 5 continued

Measure	Number of Items	Alpha Before	Alpha After	Before Correlation	After Correlation
(b) Attitude toward the Job:					
Hoppock	4	.79	.81	.73	
Sum (JDS) ...	14	.85	.85	.55	
(JDS) Pay	2	.87	.76	.56	
(JDS) Security	2	.81	.68	.49	
(JDS) Social	3	.69	.74	.36	
(JDS) Supervisor	3	.94	.91	.59	
(JDS) Growth	4	.79	.78	.61	
(c) Job Problem Severity:					
Structural Constraints ...	7	.80	.78	.63	
Daily Tribulations ...	4	.80	.62	.46	
Leadership ...	3	.63	.49	.33	
(d) Job Stress:					
Work Load ...	12	.81	.82	.48	
Preferred Work Load ...	4	.63	.56	.64	
Expected Work Load ...	4	.79	.73	.46	
Role Conflict ...	3	.77	.77	.38	
Role Ambiguity ...	3	.80	.80	.50	

Note.--Cronbach Alpha coefficient is the average of all of possible split-half correlations within a measure and serves as an estimate of homogeneity or interval consistency reliability. Test-retest correlation was over a six-month (26 week) interval.

a Productivity was over 26 weeks.

b Role orientation was a single scale

Scales developed by Graen, Dansereau and Minami (1972). The aspects of performance evaluated include: dependability, alertness, planning, know-how and judgment, overall present performance and expected future performance. The ratings (1=satisfactory to 7=outstanding) are unit-weighted and summed to produce an overall performance rating. Quality of leader-member exchange was assessed using the LMX (leader-form) developed by Graen and his colleagues (Graen and Cashman, 1975; Liden and Graen, 1980). This form of the LMX was augmented from five to seven items. It includes such items as "How would you characterize your working relationship with (name of particular member)? "(response alternatives ranged from 1=less than average to 7=much better than average), and "To what extent can you count on (name of member) to 'bail you out', at his/her expense, when you really need him/her?" (response alternatives range from 1=not at all to 7=a great deal). Responses to the seven items are unit-weighted and summed for each member. Degree of self-determination permitted was assessed using a Self-determination (S-D) measure (leader form) developed by Graen and his associates (Dansereau et. al., 1975). This measure asks three questions such as "How much power does (name of member) have to bring about changes in his/her job?" Response alternative range from 1=no power to change to 7=all the power needed. Finally, dyadic loyalty refers to the member's readiness to assist the leader and was measured using the Dyadic Loyalty (DL) index (leader form) developed by Cashman (Graen and Cashman, 1975). Both of the last two measures employ unit-weighting and summation.

Leadership Measure -- Members Ratings. Each made ratings of his/her dyadic relationship with his/her leader on LMX (member form), Self-determination (member form) and Dyadic Loyalty (member form). Each of these measures parallels a respective leader form.

Dyadic LMX Agreement. Agreement between the two members of the vertical dyad was assessed employing an index of profile similarity between the leader and the member form of the LMX. This measure was first employed by Graen and Schieman (1978) and reflects profile differences in both level and pattern. This index is calculated by squaring the differences between leader and member item responses and summing the squared differences. The higher the index value the greater is the profile disagreement.

Employee Reactions -- Value of the Job. The value of the job to the member was assessed in two different manners. First, the Motivating Potential Score (MPS), a scale developed by Hackman and Oldham, (1975), was used to measure the intrinsic reward value of the job. Second, Role Orientation (RO), a scale developed by Orris and his colleagues (Orris, Graen & Johnson, 1973), was employed to measure the perceived relevance of the job activities to one's career work.

Employee Reactions -- Job Attitudes. Employee job attitudes were assessed using the Job Descriptive Survey (JDS) developed by Hackman and Oldham (1975) and the Hoppock Job Satisfaction Blank (1935). The JDS contains five subscales which assess satisfaction with pay, security, social relations, supervisor and personal growth. In addition, overall job satisfaction is assessed by summing the five subscales. An alternative measure of overall job satisfaction is the short form of the Hoppock which contains four items, each tapping a separate aspect

of overall job satisfaction: (a) affect, (b) duration, (c) social comparison and (d) behavioral intention.

Employee Reactions -- Job Problem Severity. Job problem scales were first developed by Graen and his colleagues (Dansereau, Graen & Haga, 1975) to measure the irritants on a job. This instrument presents a list of 24 potential job problems and asks the respondent to indicate the degree to which each is a problem. Response alternatives range from "not a problem" to "a major obstacle." Three subscales are scored from these data; (a) problems with structural constraints, (b) problems with daily tribulations and (c) problems with leadership.

Employee Reactions -- Job Stress. Measures of the stress of a job included: (a) Quinn's work overload scale (1974), (b) Serey's member preferred and leader expected work load scales (1980), (c) Kahn's role conflict and role ambiguity scales (1964) and (d) Vicker's future ambiguity scale (1976).

Hypotheses

The formal hypotheses of this investigation are shown in Table 6. As can be seen, both the dual attachment and the combined predict positive reactions of members in terms of all three outcomes; however, job characteristics predict positive reactions for only the first two types of outcomes. That is, job characteristics predicts that no effects will radiate to the leader-member relationship. The direction of the predictions are that each of the three interventions will lead to positive gains in the job outcomes (Yes) or to no change (No). Turning to growth need as a moderator of the relationships between treatments and outcomes, each of the three models incorporates this growth need interaction effect. Finally, it should be noted that the combined job design and leader-member exchange intervention is hypothesized to be more than the additive effects of the two component interventions. Therefore, the three interventions are hypothesized to produce different effects.

Analysis

The experimental design of this study was for treatment conditions crossed with three employee need levels and repeated measures within cells. The four treatment conditions included job design intervention, leader-member exchange intervention, combined design and exchange intervention and control or comparison. Three alternative operational measures of employee needs were tested separately: (a) Hackman and Oldham's Growth Need Strength (GNS), (b) Orris' Role Orientation (RO), and (c) a measure developed by augmenting GNS with additional leadership alternatives and deriving a Leadership Need Strength (LNS) measure. Each of these alternative measures were trichotomized into high, medium and low needs and crossed with the four treatment conditions. Multivariate analysis of variance procedures (Bock, 1963) were employed to statistically analyze the hypothesized relationships

Table 6
Hypotheses

Model/Independent Variable	Employee Productivity	Employee Attitudes Toward	
		Work Itself	LMX
Job Characteristics (JC)			
Job Design Effect	Yes	Yes	No
Growth Need Moderator	Yes	Yes	No
Dual Attachment (DA)			
LMX Effect	Yes	Yes	Yes
Growth Need Moderator	Yes	Yes	Yes
Combined			
JD X LMX Effect	Yes	Yes	Yes
Growth Need Moderator	Yes	Yes	Yes

Results

Productivity

Productivity results are presented in Figure 2. As shown in this Figure, only group 3 (leadership intervention) demonstrated a disproportionate advantage over group 4 (comparison conditions) during the criterion period (weeks 15 to 26). The other two groups, group 2 (job design intervention) and group 1 (both leadership and job design), showed trends during the criterion period that were similar to that of the comparison group 4. This pattern of results suggested by viewing the figure are confirmed by statistical tests. Productivity as measured by number of cases completed per hour showed a significant ($p=.003$) advantage for the leadership trained group over the other three groups combined or individually in terms of gains. Gains were the improvements in productivity from before (weeks 1 to 14) to after (weeks 15 to 26).

This pattern of results characterized the entire set of dependent variables. Therefore, the results section will focus on the differences in gains over time between the leadership or LMX group and the combined other three conditions. No consistent significant differences were found among these three combined conditions.

Also shown in this figure, the trends for group 3 (leadership) and groups 1, 2, and 4 (other) revealed that the leadership group was slightly more productive over the first eleven weeks, showed no difference from weeks 12 through 14 and demonstrated a significant advantage from weeks 15 to 26 (with exception of week 16).

A clear presentation of the advantage of the leadership group over the other groups is given in Table 7. This Table presents the advantage of the leadership mean over the other group mean divided by the other group mean $(L-O)/O$. The result is the percent improvement of leadership over other. As shown in Table 7, during the first four weeks (base line period) the leadership group maintained a very slight advantage; during the next six weeks of formal training the advantage was maintained; during the next four weeks of dyadic sessions for the leadership group the advantage disappeared, and finally, during the twelve week criterion period the leadership group showed a significant advantage. The advantage of the leadership group was 4.5% before (weeks 1 to 14) and 20.8% after (weeks 15 to 26) resulting in a significant ($p=.003$) advantage gain of 16.3%.

Turning to the quality of productivity, the number of errors per case, no significant differences were found among the trends for the four groups. In fact, no significant trends of any kind were found. Quality was uniformly high for all four groups over the twenty-six weeks. The average number of errors per case was .07 or six errors per one hundred cases. Clearly, gains in productivity were not made at the expense of quality.

The results thusfar indicate that the group receiving only the leadership training far surpassed the productivity gains of the other three groups. Moreover, the other three groups showed no significant differences in gains among themselves. In terms

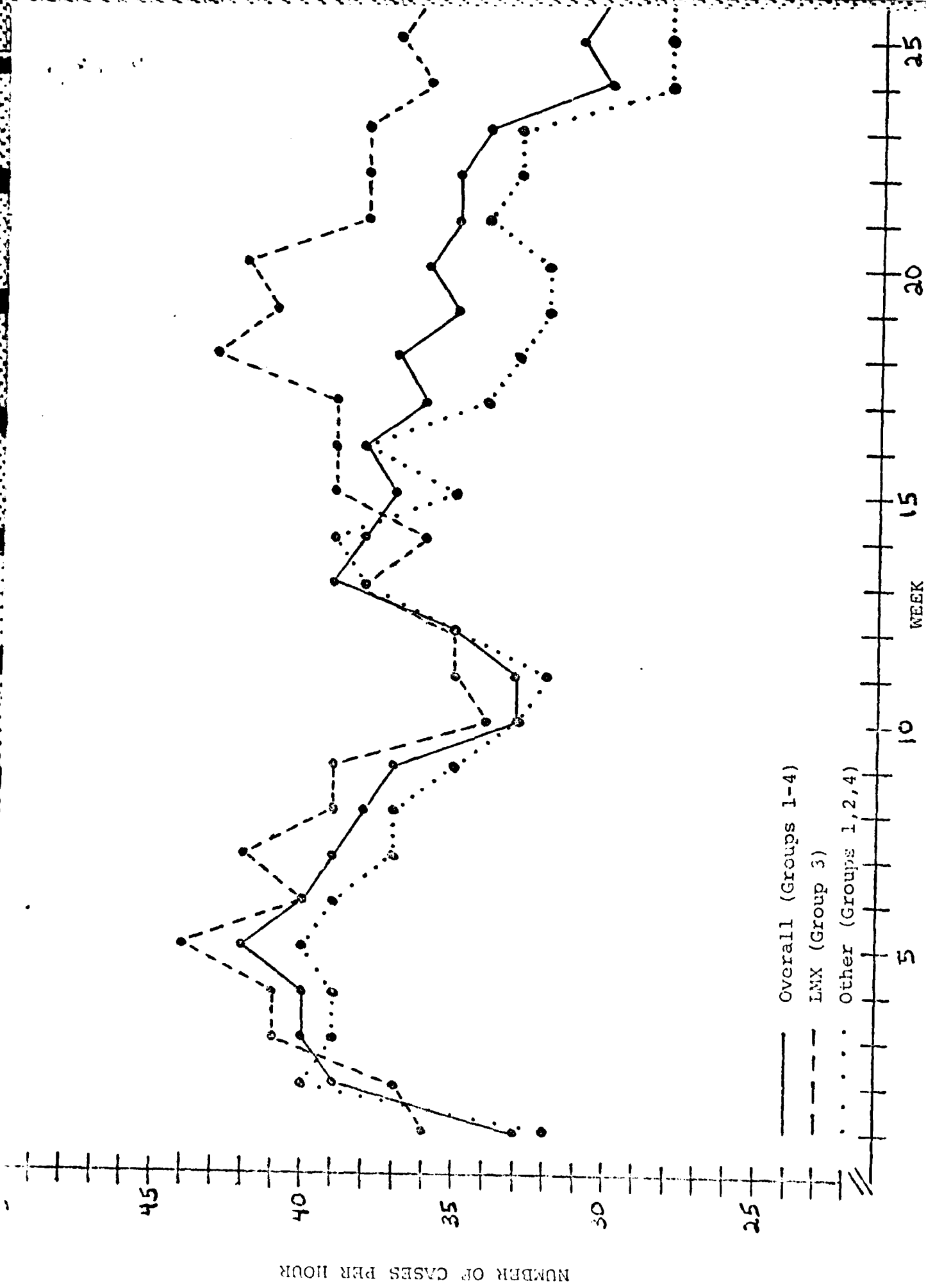


Fig. 2. Four treatment groups on productivity

Table 7

Percent Productivity Advantage of Leadership Trained
Group (n=26) Relative to Other Groups Combined (n=57)

Week	Event	Percent Improvement
1	Base Line	12.5%
2	Base Line	-7.5%
3	Base Line	5.1%
4	Base Line	5.1%
5	First LMX Session	10.0%
6	Second LMX Session	2.6%
7	Third LMX Session	13.5%
8	Fourth LMX Session	5.4%
9	Fifth LMX Session	11.4%
10	Sixth LMX Session	3.0%
11	Dyadic Sessions	9.0%
12	Dyadic Sessions	0.0%
13	Dyadic Sessions	0.0%
14	Dyadic Sessions	-7.6%
15	Criterion	11.4%
16	Criterion	2.6%
17	Criterion	14.7%
18	Criterion	30.3%
19	Criterion	28.1%
20	Criterion	31.3%
21	Criterion	11.8%
22	Criterion	15.2%
23	Criterion	15.2%
24	Criterion	28.6%
25	Criterion	32.1%
26	Criterion	28.6%

Note.-- Productivity gains from before (weeks 1-14) to after training (weeks 15-26) demonstrated a significant ($p=.003$) training effect. Average productivity gain showed a 16.3% advantage for the leadership trained group over the other groups.

of productivity, the leadership only intervention worked nicely; ⁶ *come here* whereas, the job design and the combined job design and leadership did not work.

Next we consider the possible moderating effects of employee needs. Of the three alternative measures of employee needs tested only GNS was effective. As will be recalled, the hypothesis states that those with higher growth needs will respond more positively to job enrichment and dyadic enrichment than those with lower growth needs.

Results relevant to this hypothesis for the leadership condition are shown in Figure 3. As can be seen, the high growth need group demonstrated a clear gain from before to after relative to both the medium and low growth need groups. Only during weeks 18 through 20 did the perfectly ordered results occur on productivity: (1) highest productivity for the high growth need group, (2) middle productivity for the medium need group and (3) lowest productivity for the low need group. Comparing each of the above three groups to the combined average of the other trained groups reveals a significant ($p < .01$) gain in productivity for the high need group but nonsignificant gains for the medium and low need groups.

Turning to a different comparison of the three need groups, Table 8 shows the results in terms of the advantage of the leadership trained group over the three other conditions combined. As shown, the three need groups demonstrate similar trends until the criterion period (weeks 15 through 26). During this period, the high need group diverges significantly and maintains superiority throughout. In contrast, the medium need group showed a three-week spurt during the criterion period (weeks 18 through 20) and the low need group showed a four-week ending spurt.

Finally moving to a pair-wise comparison of growth need groups, only the high need groups demonstrated a significant ($p < .001$) difference in productivity gain between the leadership trained and the three other conditions combined. Average productivity gain showed advantages for the leadership groups over the corresponding other three conditions combined of 6.7% for low need, -4.6% for medium need and 61.0% for high need. Moreover, both high need groups (leadership and combined other) were significantly ($p < .01$) different than the overall average. Hence, for the high need groups, the leadership trained group showed a significant increment over the overall average from before to after training; whereas, the other trained group showed a significant decrement relative to the overall average. These trends are plotted in Figure 4. As can be seen from this graph, the increment appears stronger than the decrement.

The analysis of variance results are shown in Table 9. As shown, the difference in productivity gain from before to after for the leadership versus the other group accounted for 15.1% of the total variance. In contrast, the effect of the trichotomized growth need (GNS) categorization accounted for zero percent and was nonsignificant. Finally, the interaction or combined effect of leadership versus other and trichotomized growth need strength accounted for 27.7% of total variance. In total, this design

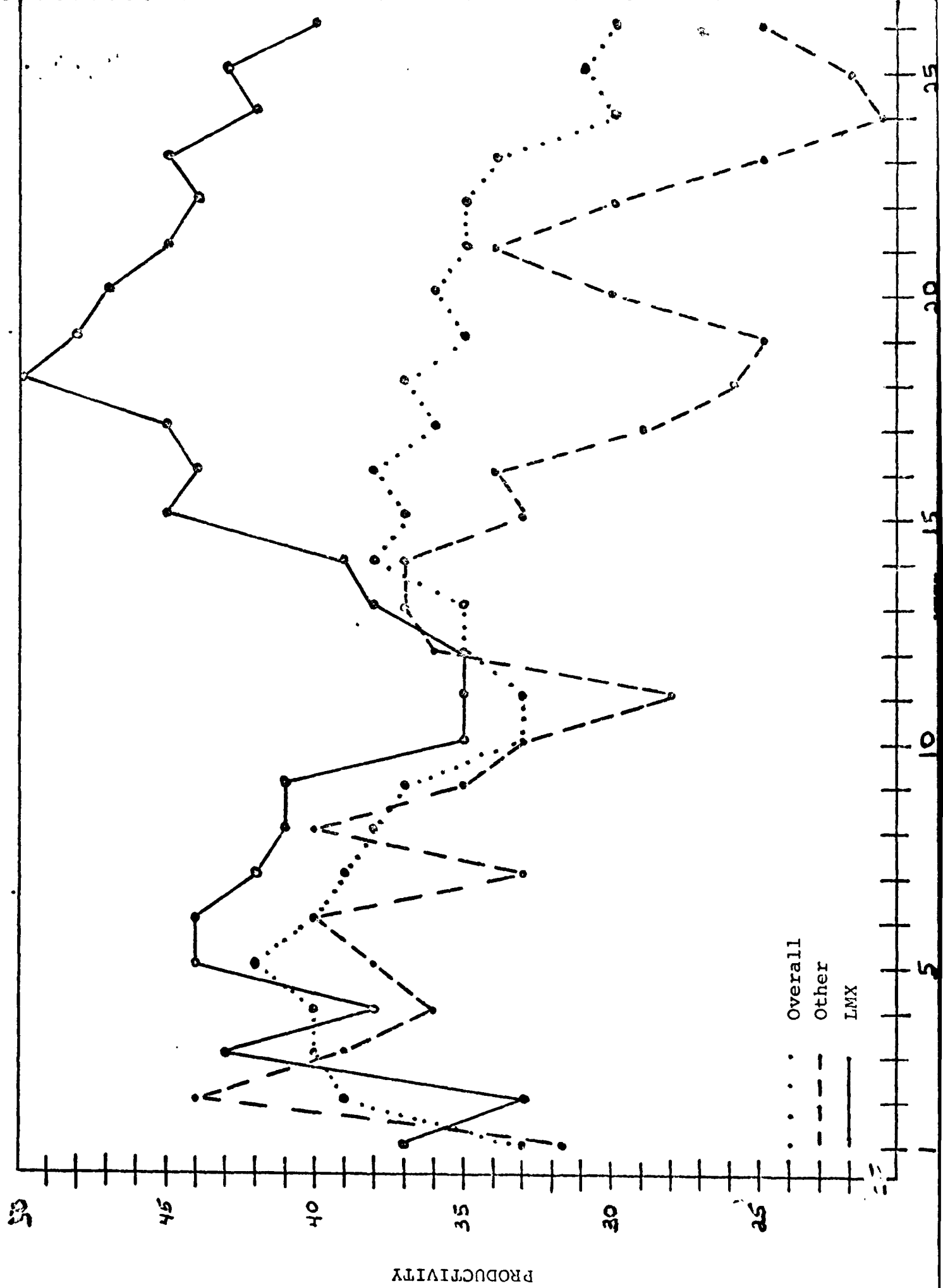


Table 8

Percent Productivity Advantage of Leadership
trained Groups with High, Medium and Low
Growth Needs Relative to Other Groups Combined (n=57)

Week	Event	Growth Need Group		
		High (n=10)	Medium (n=8)	Low (n=8)
1	Base Line	15.6%	6.3%	15.6%
2	Base Line	-17.5%	5.0%	22.5%
3	Base Line	10.3%	5.1%	5.1%
4	Base Line	2.5%	-10.3%	-15.4%
5	First LMX Session	1.0%	7.5%	1.0%
6	Second LMX Session	12.8%	-2.5%	-7.6%
7	Third LMX Session	27.0%	10.8%	16.2%
8	Fourth LMX Session	10.8%	2.7%	2.7%
9	Fifth LMX Session	17.1%	8.6%	11.4%
10	Sixth LMX Session	6.0%	3.0%	-3.0%
11	Dyadic Sessions	9.4%	9.4%	6.3%
12	Dyadic Sessions	0.0%	2.9%	-2.9%
13	Dyadic Sessions	0.0%	-7.9%	7.9%
14	Dyadic Sessions	0.0%	-15.4%	-10.3%
15	Criterion	28.6%	-8.6%	8.6%
16	Criterion	15.8%	-7.9%	-5.3%
17	Criterion	26.5%	5.9%	5.9%
18	Criterion	21.2%	30.3%	6.1%
19	Criterion	50.0%	25.0%	6.3%
20	Criterion	46.8%	31.3%	21.9%
21	Criterion	32.4%	-5.9%	2.9%
22	Criterion	33.3%	9.0%	0.0%
23	Criterion	36.4%	-6.1%	12.1%
24	Criterion	50.0%	-3.6%	35.7%
25	Criterion	53.6%	17.9%	21.4%
26	Criterion	42.9%	0.0%	32.1%

Note.-- Productivity gains from before (weeks 1 - 14) to after training (week 15-26) demonstrated a significant ($p=.0004$) combined effect of training and growth need. Average productivity gains for the leadership trained group over the other group were 6.7% for low growth needs, -4.6% for medium growth needs and 61% for high growth needs.

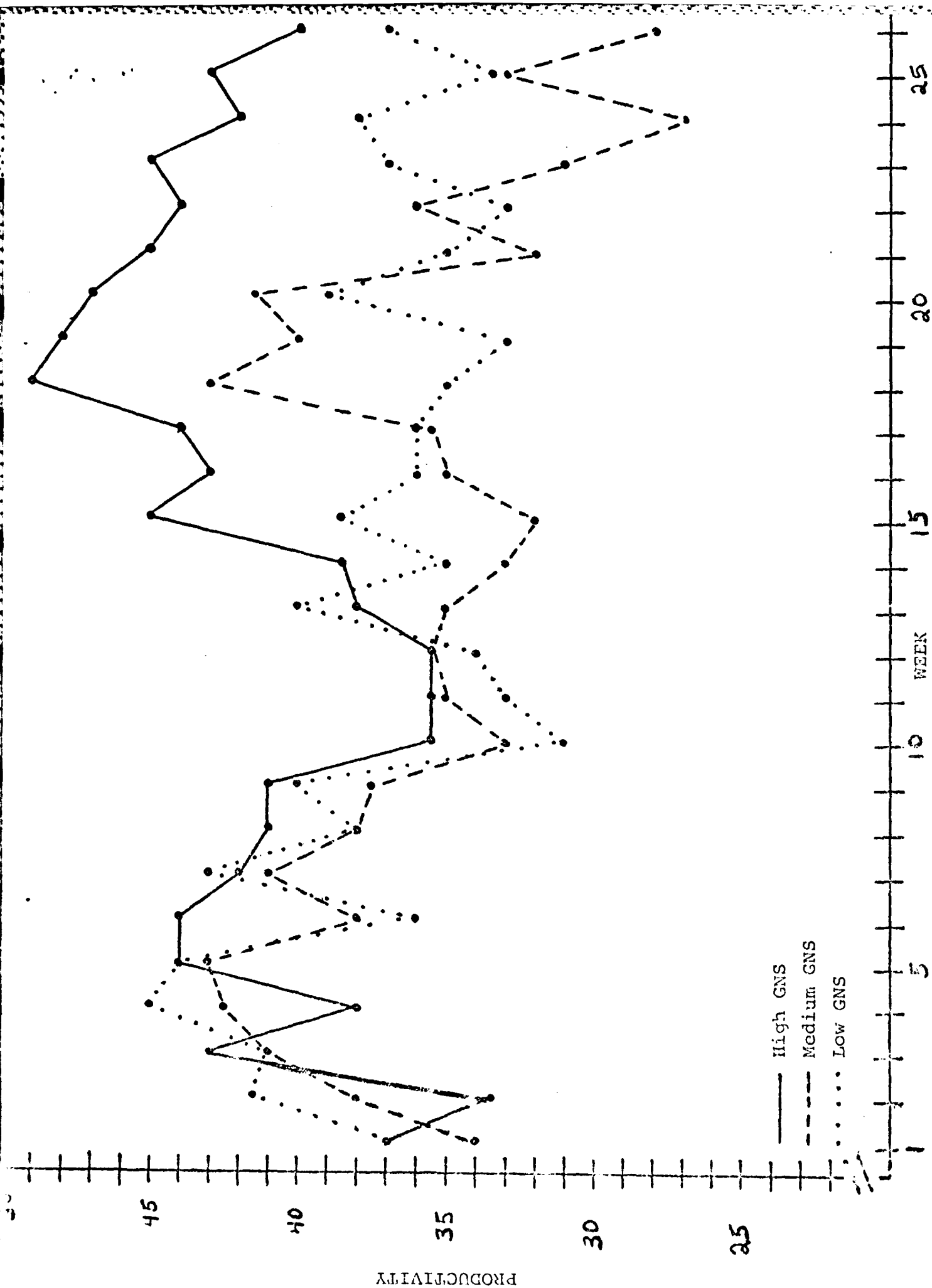


Fig. 4. Three growth need groups under the LMX treatment on productivity.

Table 9

Productivity Gain Analysis of Variance

Source	Degrees of Freedom	F-test	Tail Probability	Percent Variance
Training	1	9.36	.003	15.1%
GNS	2	.79	.459	0.0%
Training X GNS	2	8.55	.0004	27.7%
Residual	77			

accounted for 42.8% of total variance in productivity gain.

Supervisory Ratings

Immediate supervisors rated each of their members on four dimensions both before (week 1) and after (week 26). Results of mean difference analyses on these four dimensions are shown in Table 10. As shown, overall performance was not significant. Curiously, the gain for the leadership group was less than that for the other group in spite of the productivity results. Although the leadership group showed a higher average rating before (34.4) than the other group (31.9), it did not show the gain expected. Moreover, the correlation between the supervisor's employee performance rating and productivity was .22. Clearly, these two measures were tapping quite different dimensions.

Leader-member exchange was significant ($p=.0001$), but self-determination allowed and dyadic loyalty were not significant. Leader-member exchange (LMX) showed a gain of 9.1 for the leadership group and 5.0 for the other group. This measure was designed to tap the central construct of the leadership training -- the effectiveness of the dyadic working relationship. Within the Other group, the gains in LMX were 6.8 for the leadership and design group, 2.3 for the design only group and .3 for the comparison group. Hence, LMX demonstrated the most gain for the leadership only group, next for the combined, and least for the design and comparison groups. Though neither self-determination nor dyadic loyalty were significant, their trends showed gains for the leadership group.

Supervisory ratings showed no significant moderating effects of employee growth needs --all tests were nonsignificant and no trends suggested a meaningful pattern.

Supervisory ratings revealed an advantage for the leadership group over other groups only on the LMX measure. In contrast, employee performance rating did not. The correlation between these two measures was only .40 (16% common variance). These two measures were tapping different dimensions.

Leadership Measures

Self-report measures of leadership dimensions from the member's perspective complement and expand upon those reviewed above from the leader's perspective. Of the three reviewed above, LMX, self-determination and dyadic loyalty, only dyadic loyalty and LMX demonstrated significant ($p=.02$) gain for the leadership group compared to the combined other group. Figure 5 shows the pattern of means for dyadic loyalty. In effect, the leadership group changed places with the other group from before to after. Thus, the leadership group indicated that they were more receptive to aiding their immediate superiors after than before and the combined other group indicated the reverse. LMX demonstrated a larger gain for the leadership group than for the combined other groups.

Turning to the employee need hypothesis, growth need strength (GNS) showed significant differences on LMX, leadership support and leadership satisfaction (JDS) for the high need group compared to all other groups combined. As shown in Table 11, LMX demonstrated

Table 10
Effects of Leader-Member Exchange
Training on Supervisory Ratings

Measure	Mean				Tail Probability Gain
	Leadership (N=30)		Other (N=75)		
	Before	After	Before	After	
Employee Performance Rating (EPR)	34.4	34.5	31.9	33.2	.23
Leader-Member Exchange (LMX)	30.2	39.3	34.7	38.7	.0001
Self-Determination (S-D)	13.0	15.9	10.7	14.2	.30
Dyadic Loyalty (DL)	11.4	11.9	12.0	11.8	.19

Note.-- Correlations were (a) EPR and LMX = .40, (b) EPR and S-D = .15, (c) EPR and DL = .63, (d) LMX and S-D = .32, (e) LMX and DL = .63, (f) S-D and DL = .18.

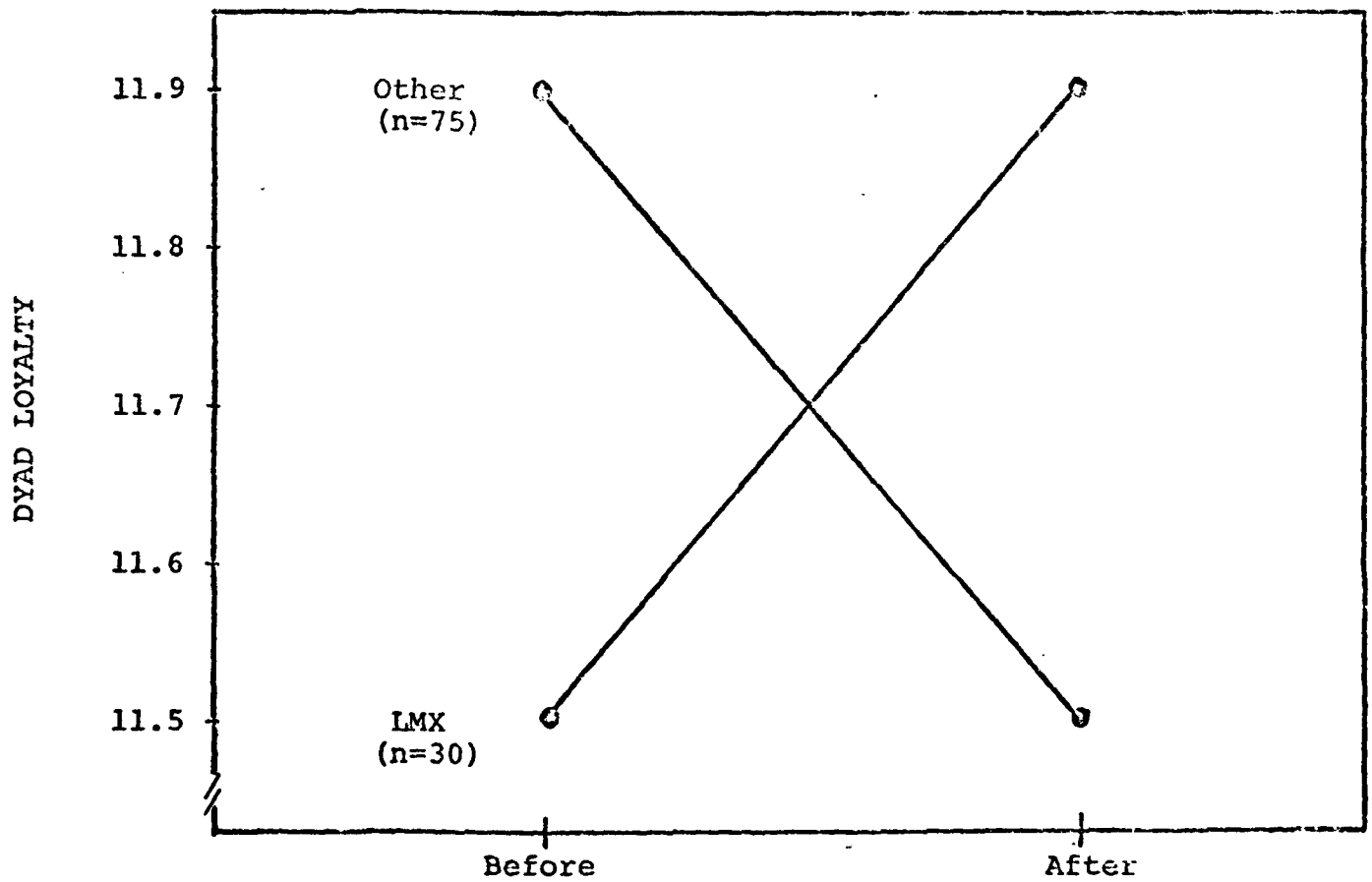


Fig. 5. Leadership and combined other on Dyadic Loyalty

Table 11

Effects of Leadership Training on High Growth
Need Strength Group

Measure	Mean				Tail Probabili Gain
	Leadership High GNS (N=10)		Other (N=96)		
	Before	After	Before	After	
Leader-Member Exchange (LMX)	15.9	18.5	19.4	19.5	.01
Leadership Support (LS)	5.2	6.5	6.4	5.8	.01
Leadership Satisfaction (JDS)	11.1	13.0	14.5	14.2	.05

Note.-- Correlations were (a) LMX and LS =.41 (b) LMX and JDS =.71, (c) LS and JDS =.39.

a significant ($p < .01$) gain of 2.6 for the high need--leadership group and a gain of .1 for all other groups combined. This pattern of means was similar to that produced by the supervisor's ratings of LMX. It will be recalled that the supervisor's ratings of LMX indicated that the leadership group was lower before and gained more than the other group. Leadership support was significant ($p < .01$) and showed a pattern of leadership initially lower than other and nearly changing positions after. Finally, satisfaction with leadership demonstrated a significant ($p < .05$) gain of 1.9 for the high need--leadership group and a loss of .3 for all other groups combined.

Although the supervisor's ratings were not affected by the moderating effect of employee growth needs, the member's ratings of leadership dimensions demonstrated significant effects of growth needs. Whereas dyadic loyalty and LMX revealed a main effect for training, LMX, support and satisfaction dimensions showed a combined training and growth need effect.

Dyadic Agreement

Agreement on LMX issues between a leader and a member within a vertical dyad relationship can indicate a good deal about the nature of their dyadic working relationship (Graen and Schiemann, 1978). This measure is different from anything analyzed thusfar in this paper. It incorporates information from both a leader and a member: the information is gathered such that each report is experimentally independent from the other and combines the information in such a way that agreement on both level and pattern can contribute to assessed agreement.

The results on this leader-member agreement measure are shown in Table 12. As shown in this Table, the leadership group demonstrated a significant ($p < .001$) gain of 34.9 compared to a gain of 13.7 for the other group. On this measure of profile similarity the larger the value is the greater is the disagreement between member and leader. Thus, the gain was in dyadic disagreement.

Considering the employee needs hypothesis, growth needs did not combine with training to produce a significant effect on dyadic agreement.

Employee Reactions

Employee reactions are divided into (a) those concerned with the value of the job, (b) those involving attitude toward the job, (c) those referring to job problems and (d) those related to job stress.

The value of the job for the individual may involve the motivating potential of the job or the capability of the job to reward one's efforts on the one hand and the relevance of the job to one's career on the other hand. As shown in Table 13, both of these dimensions of value of the job demonstrated significant difference in gains for the leadership group over the other groups. Motivating potential scale (MPS) showed a significant ($p = .02$) gain of 2.3 for the leadership group and gain of -.4 for the combined other group

Table 12

Effects of Leader-Member Exchange
Training on Leader-Member Agreement

Measure	Mean				Tail Probabilit Gain
	Leadership (N=31)		Other (N=70)		
	Before	After	Before	After	
Leader-Member Agreement (LMA) ...	43.6	78.5	62.4	76.1	.001

Table 13

Effects of Leader-Member Exchange Training
on Employee Reactions to the Job

Measure	Mean				Tail Probability Gain
	Leadership (N=31)	Other (N=75)	Before	After	
Value of Job:					
Motivating Potential (MPS) ...	24.8	27.1	26.2	25.8	.02
Role Orientation (RO) ...	2.5	2.8	2.8	2.7	.01
Work Attitudes:					
Overall Job Satisfaction (Hoppock) ...	17.7	18.8	18.5	18.3	.04
Summated Total Job Satisfaction (JDS) ...	53.5	58.2	56.9	57.1	.05
Security Satisfaction (JDS) ...	6.3	9.1	8.6	9.0	.001
Job Problem Severity:					
Daily Tribulations ...	9.6	7.5	9.1	8.6	.03
Job Stress:					
Role Overload (Quinn) ...	59.6	66.3	62.0	64.4	.02
Preferred Work Load (Serey) ...	14.0	14.3	14.0	13.6	.04
Supervisor Work Load (Serey) ...	15.7	17.0	16.1	16.1	.02
Future Ambigutiy (Vickers) ...	14.7	12.1	12.5	11.9	.01

(-1.3 for the combined treatment and .7 for the job design treatment). This gain moved the leadership groups from the clerical level to the professional level on MPS norms. The other group remained at the technician level. Role orientation (RO) produced a significant ($p=.01$) gain of .3 for the leadership group and -.1 gain for the other group. Hence, the job had been enhanced on both dimensions of value for the leadership group compared to the other group. The correlation between MPS and RO was .39.

Turning to work attitudes, both types of measures of overall job satisfaction showed significant ($p<.005$) training effects. The Hoppock Job Satisfaction Blank with its four ways to tap wholistic satisfaction with a job in general demonstrated a 1.1 gain for the leadership group and a -.2 gain for the combined other group. In agreement, the Job Description Survey (JDS) with its summation of satisfaction with pay, security, social, supervisory and growth aspects of the job showed a 5.3 gain for leadership and a .2 gain for combined other. Moreover, within the JDS, security satisfaction was affected significantly ($p=.001$). Hoppock and JDS Satisfaction were correlated .50.

Job problem severity revealed a significant ($p=.03$) reduction of 2.1 for the leadership group and a reduction of -.5 for the other group on daily tribulations. This indicated that this source of irritation from the job was reduced for the leadership group compared to the other group. Neither structural constraints nor exchange problems showed a significant treatment effect on reduction.

Finally turning to job stress measures, training produced significant gains on Quinn's measure of role overload ($p=.02$), Vickers measure of future ambiguity ($p=.01$), and Serrey's measures of preferred work load ($p=.02$). On role overload the leadership group showed a gain of 6.7 and the combined other group showed a gain of 2.4. Thus, work load was higher for both groups but significantly higher for the leadership group. This increased pressure for production is compatible with the improved production of the leadership group. Both member preferred work load and supervisor preferred work load showed significant gains for the leadership group compared to the other group. Member preferred work load demonstrated a .3 gain for the leadership group and a -.4 gain for the combined other group and supervisor preferred work load showed a 1.3 gain for the leadership group and a zero gain for the combined other group. Finally, future ambiguity was reduced for the leadership group compared to the other group ($p=.01$). The leadership group declined 1.6 and the combined other group declined .6.

Summary

The main results of this study were as follows.

1. Only one of the three training interventions produced the hypothesized gains in productivity -- LMX leadership training alone.
2. LMX leadership training demonstrated significant ($p=.003$) and strong (15.1%) effects on quantity of production (number of cases completed per hour) and not at the expense

of quality of production (number of errors per case) between a fourteen-week before period and a twelve-week after period.

3. Productivity advantage of LMX trained group over the combined other group was a 16.3% gain from before to after.
4. Employee growth needs (GNS) moderated the relationship between LMX training and productivity as predicted. High growth need members out-performed their LMX trained cohorts on quantity of production. This interaction of training and growth need was both significant ($p=.0004$) and strong (27.7%).
5. On the negative side, high growth need members in the combined other condition under performed their other trained cohorts.
6. Supervisory performance ratings failed to show either treatment or interaction effects and failed to agree with productivity.
7. Supervisory ratings of LMX showed a significantly ($p=.0001$) greater gain for the LMX trained group over the combined other group.
8. Supervisory ratings showed no significant moderating effects of employee growth needs (GNS).
9. Member's report of dyadic leadership demonstrated a significant effect of training on dyadic loyalty and LMX. As predicted, the advantages were to the LMX trained group.
10. Employee growth needs (GNS) moderated the relationships between LMX trained group versus combined other group and the dependent variables of leader-member exchange quality, leadership support and satisfaction with leadership. On all three dependent variables the advantage was to the high growth need group who received LMX training.
11. Dyadic agreement, a profile similarity index between leader reports and member reports on LMX quality, revealed a significant ($p=.001$) training effect. LMX trained group showed higher gains in dyadic disagreement than the combined other group.
12. Employee reactions to the job showed significant training effects on (a) the value of the job, (b) attitude toward the job, (c) job problems and (d) job stress.
 - a. On measures of value of the job, the LMX trained group had greater gains than the combined other group on both the motivating potential of the job (MPS) and the relevance of the job to career aspirations (RO).
 - b. On attitude toward the job, the LMX trained group also had larger gains than the combined other group on two alternative measures of overall job satisfaction -- Hackman and Oldham's JDS and the Hoppock Job Satisfaction Blank.
 - c. On severity of job problems, again the advantage was to the LMX trained group with higher reduced severity for daily tribulations.

- d. On measures of job stress, once again the advantage was to the LMX trained group with higher preferred work load and lower future role ambiguity. Kahn's measures of role conflict and role ambiguity failed to reach significance.

Discussion

Overall the results clearly support the Leader-Member Exchange intervention model and strongly suggest that the employee growth need formulation be elaborated and refined. Moreover, the results suggest that the job design intervention model requires further specification to highlight its crucial parameters.

Clearly, the LMX training intervention was gratifyingly effective in producing significant gains in productivity, supervisory ratings of LMX quality, members rating of dyadic loyalty, LMX quality, motivating potential of the job, role orientation, overall job satisfaction, job problem severity and measures of job stress as well as dyad agreement. Very little need be stated about this beyond a mere listing of the results -- they are indeed convincing.

Moreover, the moderating effect of employee growth needs on LMX training also was gratifying. Hackman and Oldham's measure, GNS, was quite effective in identifying those members who responded most positively to LMX training. Although two alternative moderating variables were tested in this study including a new measure of leadership growth needs and previously developed measure of role orientation, only GNS worked. In spite of a good deal of criticism, much of it undeserved, heaped upon GNS in the literature, it worked -- and worked beautifully. More will be stated about this undeserved criticism later in this section.

With equal conviction we conclude that the job design intervention did not work. In fact, it failed so abysmally that it probably helped destroy the LMX training effect for the combined intervention. The question is why did it fail so completely. Two factors may help explain this failure of the job design intervention. First, the changes that were made may have been insignificant or even trivial as seen by the members. If members viewed the structural changes as lacking meaning for them on their jobs, their responses would be compatible with those observed in this study. Second, the changes were not effective in improving the motivating potential of the job. When members did not see adequate improvement in the potential rewards of their jobs, they would not be likely to respond in positive manners.

Though special efforts were taken to ensure that significant structural changes could be made in these jobs and that changes would be directed at improving the motivational potential of the jobs, we conclude that these events did not produce the intended results.

In the case of the combined leadership and design group, it appears that in addition to the lack of credibility of the design changes, the time pressure on leaders was a contributing factor. Both LMX and design interventions required a good deal of time from leaders -- time which was borrowed from other duties and had to be repayed. When the time pressures on leaders became too great, LMX

activities rather than design activities were foregone. This was predictable for two reasons. First, LMX activities can be rather threatening to leaders. Leaders who have not employed a leadership model similar to the LMX model often find the procedures scary and potentially embarrassing for both parties to a dyad. They find themselves threatened by a fear of the unknown yet potentially powerful consequences of these activities. Consequently, they must be encouraged and supported successively at various steps throughout the dyadic exchange process. Without this encouragement and support, leaders seldom complete the process as prescribed. Second, design activities appear to be more similar to standard supervisory functions. Hence, leaders should be less threatened by these procedures. Unfortunately, this apparent similarity with standard supervisory functions may be one of the main weaknesses of job design interventions. If job design is performed according to the model, it involves dealing with many of the same potentially embarrassing interpersonal exchange forces that are dealt with using the LMX model. However, it may be easier to avoid dealing with these forces directly using the job design model compared to the LMX model. Moreover, this apparent similarity also may make it easier for leaders to justify investing their precious time in job design rather than in LMX activities.

The results are clear: the LMX intervention was effective on measures of objective productivity, supervisory ratings of dyadic exchange and member reactions to dyadic exchange and various aspects of the job situation. Job design intervention was not effective on these measures. Finally, the combined job design and LMX intervention also was ineffective on their measures.

We have learned a great deal about the use of both of these intervention models. Although we tend to learn more from successes than failures, we learned quite a bit about the parameters and process of the job design intervention model. We learned first hand that Hackman's (1977) list of necessary conditions for a successful job design intervention is incomplete or at least imprecise. Without a doubt, job design requires much more than is stated in the literature. Unfortunately, with experimental failures we can only speculate and hypothesize. But we can experiment again and test these speculations in the form of hypotheses.

In the present study, the effectiveness of the LMX intervention documented what the first phase of the LMX process can accomplish. Yes, only the first phase. The dyadic exchange process was only begun in this study. The complete process involves dyadic exchange contracting with testing and guided renegotiation over time until new exchanges become stabilized. Only this first phase, exchanging dyadic expectations between a leader and a member was implemented and neither the second phase, dyadic exchange contracting, nor the third phase, testing and guided renegotiation, was attempted.

Elaborating the LMX model by specifically incorporating GNS as a measure of employee growth needs is quite compatible with the basic premises of the model. The model assumes that both leaders and members come to the dyadic exchange with their unique genetic

endowment, past history and current circumstance and that their growth need strength as a moderator of the relationship between leader-member exchange and various job outcomes fits neatly into the LMX model.

At the operational level, Hackman and Oldham's measure, growth need strength (GNS), was effective in identifying those members who responded more positively to LMX training in the present study. Moreover, our attempts to develop a superior measure of leadership growth needs failed as did our attempt to employ role orientation (RO). In spite of much criticism, GNS works. Much of the published criticism appears undeserved and due to a misunderstanding about the ipsative nature of the measure. A good deal of the criticism pointed to the apparent lack of internal consistency in the GNS measure. However, the internal consistency of ipsative measures cannot be evaluated using the usual procedures. These procedures are appropriate only with normative measures. On addition, internal consistency cannot be used to estimate the reliability of a ipsative measure but test-retest procedures can. In the present study the test-retest correlation for GNS was .65. This was as high as many of the most reliable measures in this study.

Despite the effectiveness of the LMX intervention, it should be stated one last time that the process was only a beginning -- a promise of events to come. It was only the first phase of a three phase process. What will happen if the second and third phases are not forthcoming? What will happen if they are? Can the first phase results be maintained by periodic boosters? Can the first and the second? These questions and more require empirical testing.

In conclusion, we are encouraged by the effectiveness of the LMX model and plan to incorporate growth needs more richly into the network of the model. Moreover, we are lead by the results of this study to conclude that an LMX intervention can produce improvements in two linkages to the employee: both the dyadic exchange and the work itself. The improvement in the motivating potential of the job under LMX treatment was rather convincing. In fact, the effects of an LMX intervention can be extremely pervasive as we have seen. Although the LMX model focuses upon the dyadic exchange, its processes affect both dyadic enrichment and job enrichment.

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